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ABSTRACT

This self-directed study unit for grades K-3 and 4-8 was developed expressly to transport the student from the position of passive recipient to active participant in his/her own pursuit of knowledge. Within the guide are two complete units: one created for the lower elementary student and one for the upper elementary/middle school student. Units emphasize higher-level thinking skills and are interdisciplinary in content. A teacher's section discusses the philosophy behind the unit; the format; suggestions for getting started, further research, and adapting the unit; and 13 suggested readings. The lower elementary unit covers basic ecological concepts and vocabulary such as an awareness of ecosystems, energy cycles, populations, and pollution. The upper level unit covers ecological change, food webs, ecology careers and ecologists, and sustainable lifestyles, in addition to vocabulary and basic ecological concepts. Both units involve students in simple activities and library research. Additional sections provide instructions for seven complimentary art activities, information on environmental organizations, and a 20-item bibliography. (LZ)

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ECOLOGY

Learning to Love Our Planet

A Zephyr Press Learning Packet

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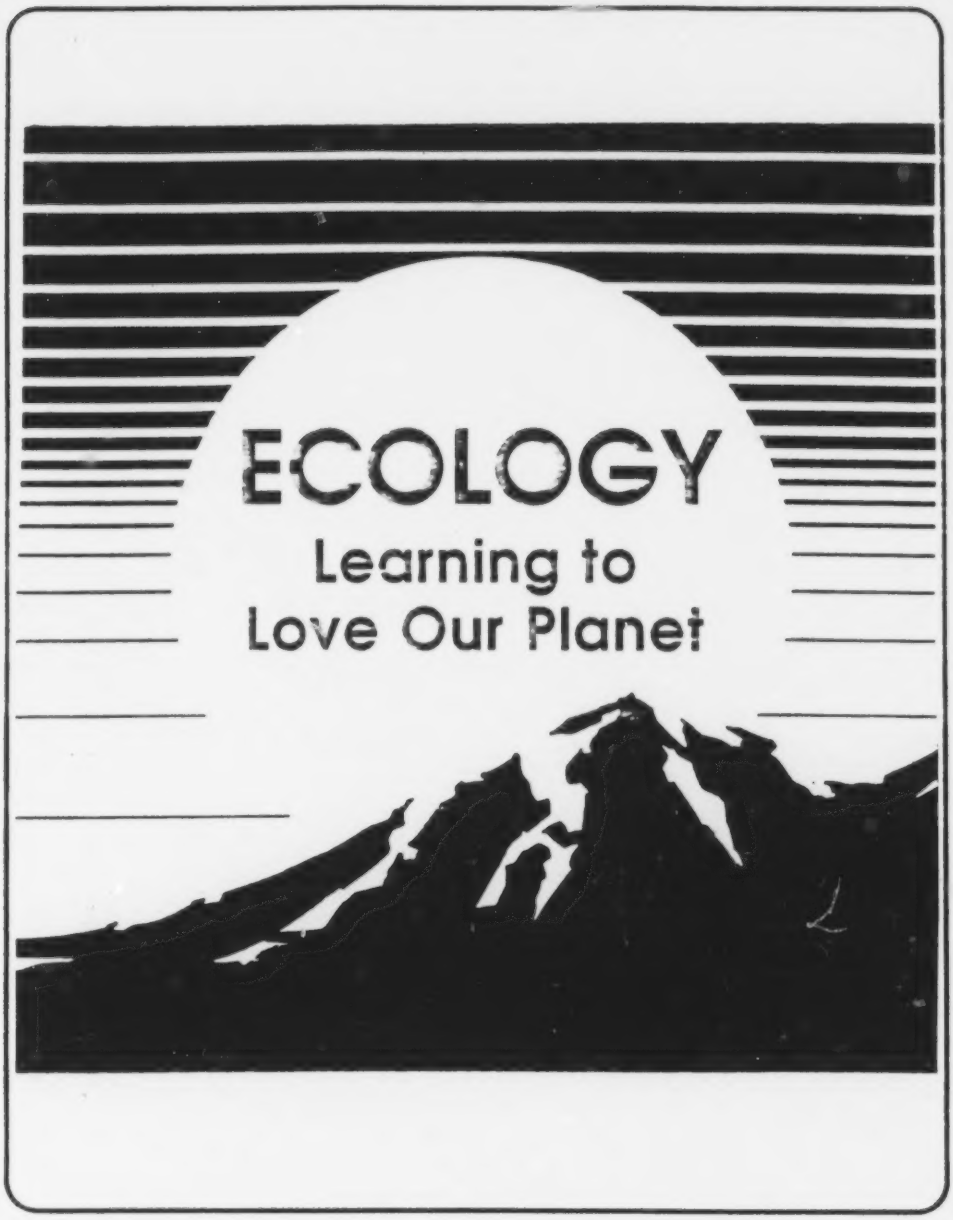

A SELF-DIRECTED LEARNING EXPERIENCE

Each packet:

- is reproducible
- requires little teacher preparation
- works well with the entire class, individually, or with a small group
- includes two group levels: K-3 and 4-8, a bibliography, and learning center ideas

ECOLOGY

Learning to Love Our Planet

By Judith Enz and Susan Diffenderfer

Self-directed study units
for grades K–3 and 4–8.

Process- and product-oriented
interdisciplinary learning through:

Evaluating
Imagining
Researching
Reporting
Thinking and reacting
Mapping and charting
Creating and appreciating
Classifying and comparing
Career exploration and goal clarification

Zephyr Press
Tucson, Arizona

ECOLOGY
Learning to Love Our Planet

Grades K–8

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The horizon leans forward,
Offering you space to place new steps of change.
Here, on the pulse of this fine day
You may have the courage
To look up and out and upon me, the
Rock, the River, the Tree, your country. . . .
You may have the grace to look up and out
And into your sister's eyes and into
Your brother's face, your country
And say simply
Very simply
With hope
Good morning.

Maya Angelou
A Rock, a River, a Tree

Contents

Premise vi

Teacher's Section

- A Word to the Teacher 1
- Rationale for Self-Directed Learning 2
- From Passive Learner to Active Participant 4
- The Format 5
- Suggested Readings 6
- Getting Started 7
- Interest Development Center 8
- To Prepare for Further Research 9
- Suggestions for Adapting the Unit 10

Unit I: Kindergarten through Grade Three 11

Unit II: Grades Four through Eight 33

Answer Key 65

Environmental Organizations 66

Exploring the Arts 67

Bibliography 75

The Premise

Learning Is Natural

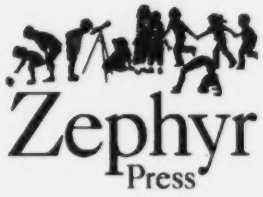
Children are active participants in their learning, not passive vessels to be filled.

They are always seeking and choosing what they will learn and what they will not learn.

Their interest, trust, and active involvement are crucial.

Children tend to become personally involved in projects that appeal to a variety of modalities—reading, writing, reasoning, building, imagining, and creating.

What a gift we give when we respect the child's natural need to explore, to reflect, to communicate, to dream, to celebrate!



(Available in poster form from Zephyr Press)

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A Word to the Teacher

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Come along on an ecological journey, a journey that will lead you through beauty, awe, fear, and humility. Ultimately you will grow into a kinship with the vast and largely unseen communities with whom you share this Earth.

The first step begins with awareness, the developing of a keen eye and sensitivity to your surroundings, both living and nonliving. From awareness springs curiosity about those things that share this time and place with us and about their effect on us and ours on them. Curiosity leads to exploration and experimentation, and from these things grow understanding and perspective.

Rationale for Self-Directed Learning

Our children's education must be more than the memorization of capitals of states, products of countries, and dates and places of past wars. Most teachers and parents would agree that what is also wanted is for our children to learn to think for themselves, to make wise choices, to work independently, to evaluate thoughtfully the results of their study, and to use their knowledge and skills creatively.

Obstacles to Independent Learning

In spite of the teacher's best efforts, many, if not most, classroom programs involve students in schedules and organizational plans that foster dependence rather than the independence we prefer. Students are told what is to be learned and how long it will take them to learn it. The teacher not only defines the resources but also decides whether the learning experience was a satisfactory and valuable one.

A Learning Atmosphere

Each time we, as educators, focus on what our objectives are, we need to take a fresh look at our classroom mode of operation and evaluate the effectiveness of the way we teach. Quite naturally, for most of us, our teaching style has had more to do with how we were taught than with what recent research has shown about the learning process. Even our good instincts have been overcome by the years of conditioning we have known in our own educational processes.

Like a breath of fresh air, recent findings from research on the brain support our intuitive knowledge. This research shows that our brains are receptive to learning only under certain conditions. Our job is to translate that information into a classroom atmosphere that provides

- challenge
- freedom within structure
- trust and warmth
- recognition of each student's learning process
- opportunities to experience success
- personal involvement in the curriculum

A natural transition generally occurs that transforms the former "teacher-lecturer" into a "fellow learner." As fellow learner, the teacher becomes a resource person, a facilitator, and a classroom manager. In this maturing atmosphere, students gradually come to see themselves as responsible for their own learning, and a foundation for self-direction is set.

At this point, an unexpected problem sometimes arises. We find students no more ready for their independent learning than we, as teachers, were ready to allow it. This common occurrence is mentioned repeatedly in the literature dealing with programming for the gifted, an area in which independent study and research are recommended as major curricular activities. See Suggested Readings.

From Passive Learner to Active Participant

(Bridging the Gap)

The Zephyr self-directed study unit was developed expressly to bridge that gap: to transport the student from the position of passive recipient to that of an active participant in his/her own pursuit of knowledge.

Within the defined structure of each unit, students are given opportunities to

- make choices
- learn at their own paces
- learn in a manner suited to their own learning styles
- expand their research skills
- use a variety of modalities
- plan their own time
- develop the skills of creative, critical, and evaluative thinking
- experience whole-brain learning

Because assuming responsibility for directing their own learning is often an unfamiliar situation for students, they will need your encouragement at the start. Generally within six to nine weeks most students will be well on their way from teacher-dependence to self-motivation. (Beginning the venture with only a few choices, then gradually arranging the setting so that there are more and more choices works best.) As students assume more responsibility, many teachers begin to consider the school library as just another part of the classroom. Both teachers and students can benefit from the enormous resources available in most school libraries.

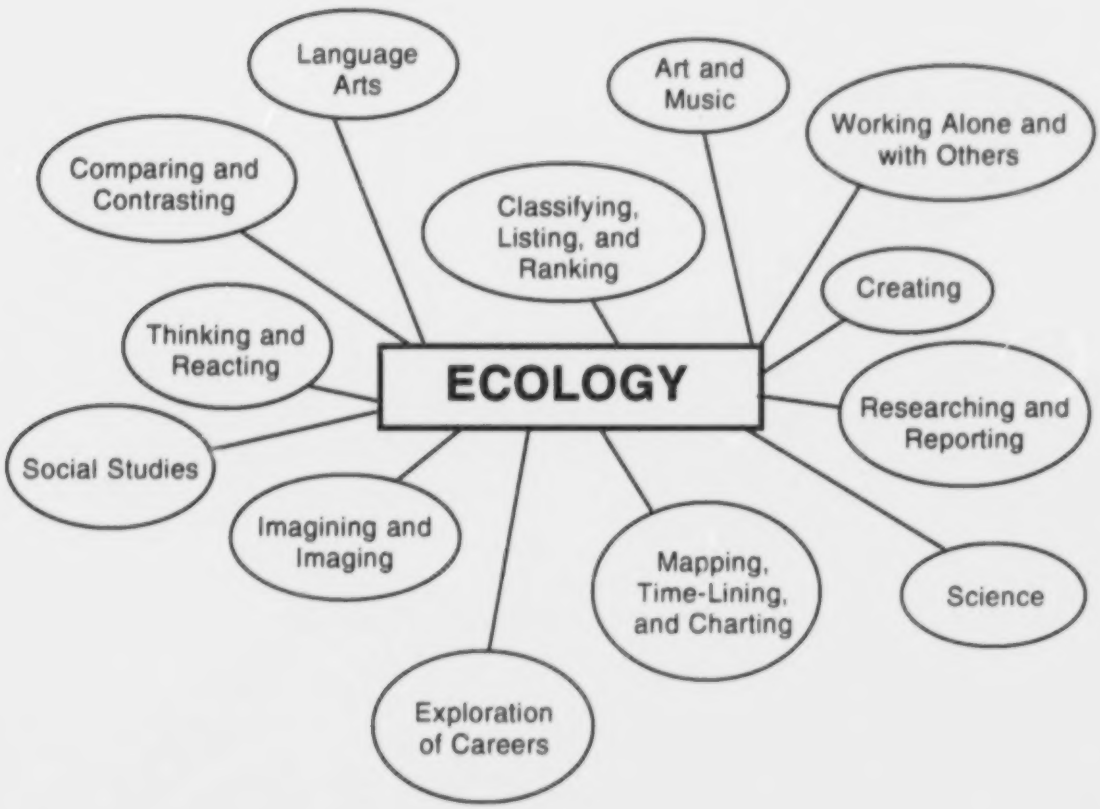
Eventually, a few students will be ready for a true investigative research study of professional quality as suggested by Joseph Renzulli in *Enrichment Triad Model: A Guide for Developing Defensible Programs for the Gifted and Talented.*

The Format

These units were originally developed for gifted students, but we now recognize that every child is gifted in one or more of the multiple intelligences. The units emphasize the use of higher-level thinking skills and are appropriate for use in any classroom where the goal is to encourage students to become responsible for their own education.

Interdisciplinary in content, each unit envelops a broad view of the topic by integrating the "basics" into each activity.

Within this book are two complete units: one created for the lower elementary student and one for the upper elementary student. Suggestions for adapting or adjusting either of the levels to fit any individual classroom are included.



Suggested Readings

Self-Directed Study

Armstrong, Thomas. *In Their Own Way: Discovering and Encouraging Your Child's Personal Learning Style.* Los Angeles: J. P. Tarcher, 1988.

Brewer, Chris, and Don G. Campbell. *Rhythms of Learning: Creative Tools for Developing Lifelong Skills.* Tucson, Ariz.: Zephyr Press, 1991.

Clark, Barbara. *Optimizing Learning.* Columbus, Ohio: Merrill Publishing Company, 1986.

Gallagher, James. *Teaching the Gifted Child.* 3d ed. Boston: Allyn & Bacon, 1985.

Gardner, Howard. *Frames of Mind: The Theory of Multiple Intelligences.* New York: Basic Books, 1985.

Kline, Peter. *The Everyday Genius: Restoring Children's Natural Joy of Learning.* Arlington, Va.: Great Ocean, 1988.

Maker, C. J. *Curriculum Development for the Gifted.* Rockville, Md.: Aspen Systems Corporation, 1982.

Malehorn, Hal. *Open to Change: Options for Teaching Self-Directed Learners.* Palo Alto, Calif.: Scott Foresman and Company, 1978.

Miller, Ron. *What Are Schools For? Holistic Education in American Culture.* Brandon, Vt.: Holistic Education Press, 1990.

Purkey, William, and John Novak. *Inviting School Success: A Self-Concept Approach to Teaching and Learning.* 2d ed. Belmont, Calif.: Wadsworth Publishing Company, 1984.

Renzulli, Joseph. *Enrichment Triad Model: A Guide for Developing Defensible Programs for the Gifted and Talented.* Mansfield, Conn.: Creative Learning Press, 1977.

Stoddard, Lynn. *Redesigning Education: A Guide for Developing Human Greatness.* Tucson, Ariz.: Zephyr Press, 1991.

Udall, Anne J., and Joan E. Daniels. *Creating the Thoughtful Classroom: Strategies to Promote Student Thinking.* Tucson, Ariz.: Zephyr Press, 1991.

Getting Started

1. Select a topic as an extension of a regular subject (particularly when your class seems to crave more), or select a topic to pursue that is of particular interest and may not be a part of the curriculum. To zero in on special interests, administer an interest survey to each student.
2. Copy the unit for each student. When using these units for the entire class, you may want to expand or delete activities for individual students.
3. Set up a center in the classroom that encourages exploration in the subject field. You'll want to include a variety of materials. Be creative—the purpose of the center is to excite the students, so begin with lots of hands-on materials. Allow for ample browsing time and encourage students to investigate and become absorbed.
4. Go over each activity in the unit with the students, discussing and answering any questions. You, as teacher, are the key to successful implementation. Because most children are already well versed in the "One Right Answer" game, they will need encouragement to branch out into many of the open-ended activities in the packets.
5. Set the stage. Plan conferences and provide resources as needed. Then, get out of the way and let your students learn.
6. Give as much time as each student needs to complete each activity in the unit. The entire packet might take from five to ten weeks or longer.
7. As each activity is completed and evaluated, initial the activity near each number. You will want to evaluate on the basis of the response that is appropriate for each individual student.
8. When a student shows extreme interest in the topic, the completion of this unit might be only the beginning. This student may be ready for further study and research and may need only resources, guidance, and freedom to pursue his/her well-planned project.

Interest Development Center

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The purpose of the interest development center is to stimulate interest in the topic. The students need time for browsing and investigation to reap the maximum benefit of the unit. These are beginning ideas; you and your students will think of more. Let parents and other teachers know about the center, and it will grow many times without effort.

Books, Films, Videos, Filmstrips, and Charts

Plant and animal adaptation
Symbiosis
Conservation
Endangered species
Natural resources
Wilderness areas, beaches
Life in the various ecosystems
Energy use and conservation
Environmental awareness
Environmental issues, concerns
Food chains
Pollution:
- land, air, water
- industrial chemicals/disposal
- pesticides, fertilizers
- organic wastes

Population
City ecology and urban life
Careers

Local Speakers

Officials from utilities, city planning, water departments
Conservation groups
Nature museum representatives
Ecologists (geographers, biologists, urban planners, hydrologists)

Artifacts for Investigations and Experimentation

Items from nature
Jars, aquarium, screened boxes
Thermometer, light meter
Microscope, magnifying glass, binoculars
Tape recorder
Collecting bags (paper)
Solar cell
Local newspapers
Field guide to local plants and animals
Newsletters of environmental organizations

Records and tapes

Nature songs
Environmental sounds
Traditional music inspired by environment:
- Grand Canyon Suite (Grofe)
- La Mer (Debussy),etc.

Maps

Local geological, physical
Aerial photo of community (old and new)
U.S. maps of the states
Bus and bicycle path maps

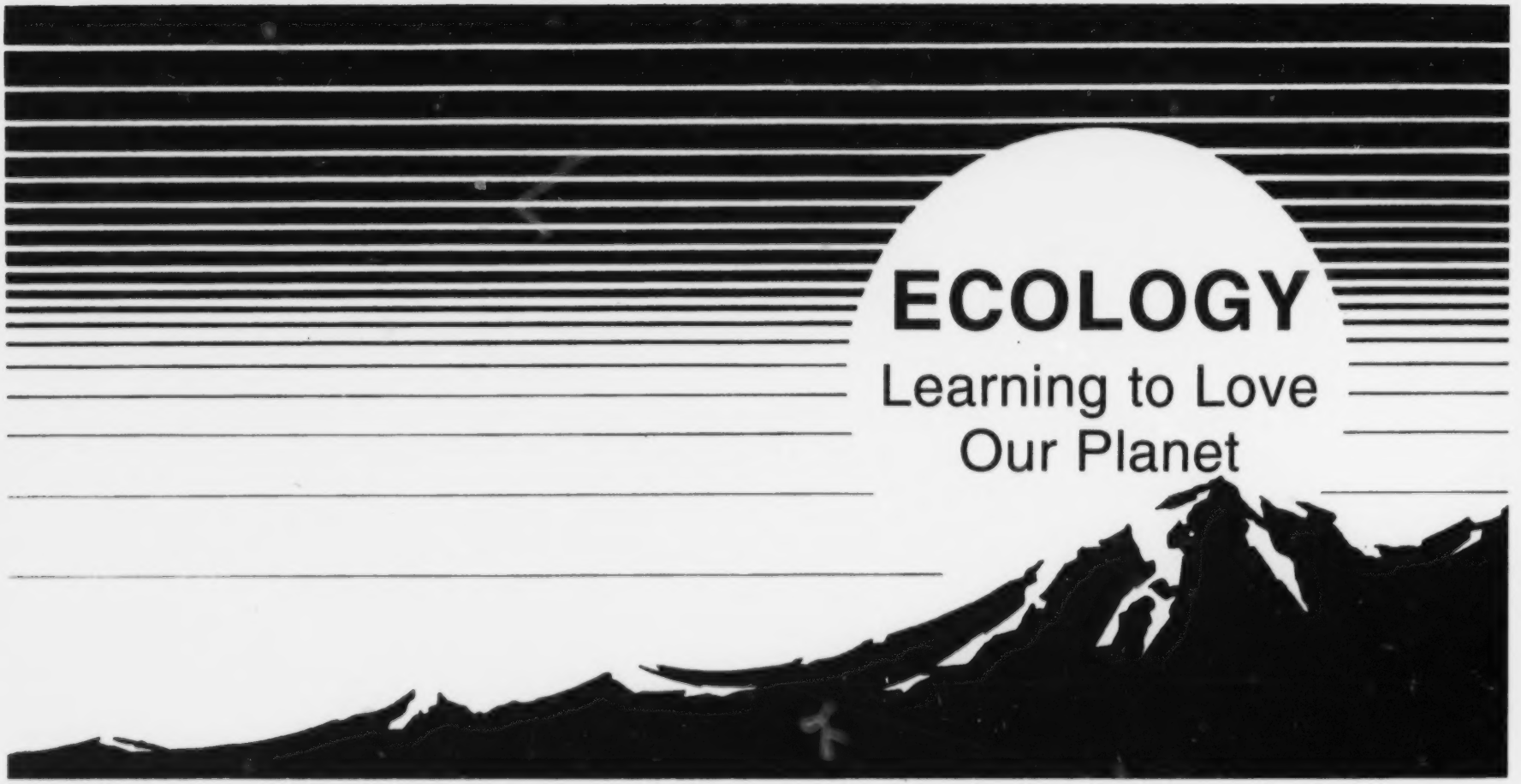
To Prepare for Further Research

Students will need to decide:

- What will the study be? What will be investigated and produced?
- Where will the background information be found (e.g., speaker, interviews, books, film, microfiche, documents)?
- What, exactly, will be the form of the product: a model, a manuscript, or . . . ?
- Who might be interested in the product: professionals in the field, publishers, organizations, or . . . ?
- What is needed to begin: specific plans, resources, deadlines, or . . . ?

Suggestions for Adapting the Unit to Your Particular Learning Situation

- Require fewer or more research sources.
- Assign more of the activities to small groups instead of to individual students.
- Give fewer or more choices.
- Delete some activities altogether.
- Arrange the unit as a class project and have students choose different parts to complete.
- Add some activities of your own.



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Learning to Love Our Planet

Name _____ Date _____

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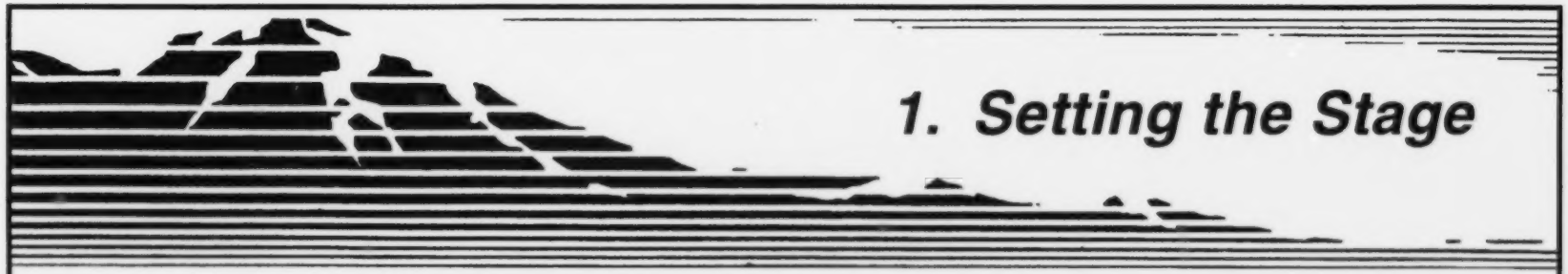

1. Setting the Stage

Look around you.

Look at the people, at the chairs, the books, the papers . . . Imagine the tiny things you can't see—the bits of dust, the insects within the walls, the bacteria . . .

Now go to the window. Look out as far as you can see—at the buildings, the trees, the cars, the birds.

In your mind, look beyond what you can see here. Look far beyond to the countryside, with its forests and farms and lakes, to the ocean, with its fish and whales and microscopic sea life.

Imagine other lands, other peoples, climates, insects, animals—all busy with their own lives at this very moment, as you are.

You may feel alone, but you are a part of a large community of living things. You

Together we share this Earth, this day, and tomorrow.
It's time we became acquainted.

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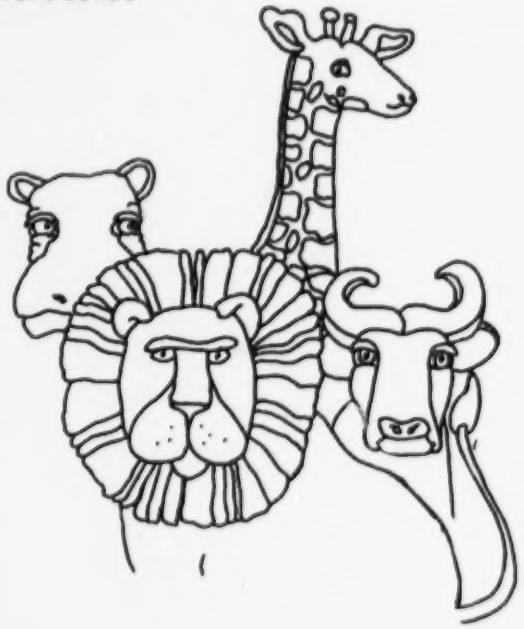
2. Ecosystems: Vocabulary

In any one place on Earth, you will find certain animals and plants living together. They are at home there. Look at a different place. You will find a different collection of plants and animals.

Make several lists of plants and animals that live together.

As you learn about ecology, you will get to know these words well:

Ecosystem
Biome
Biotic
Community
Physical
Environment
Habitat



Find out what biome means.

- Choose one biome. List the things, living and nonliving, you would expect to find there. Create a mural or diorama of the biome. Use the word list to describe your creation.

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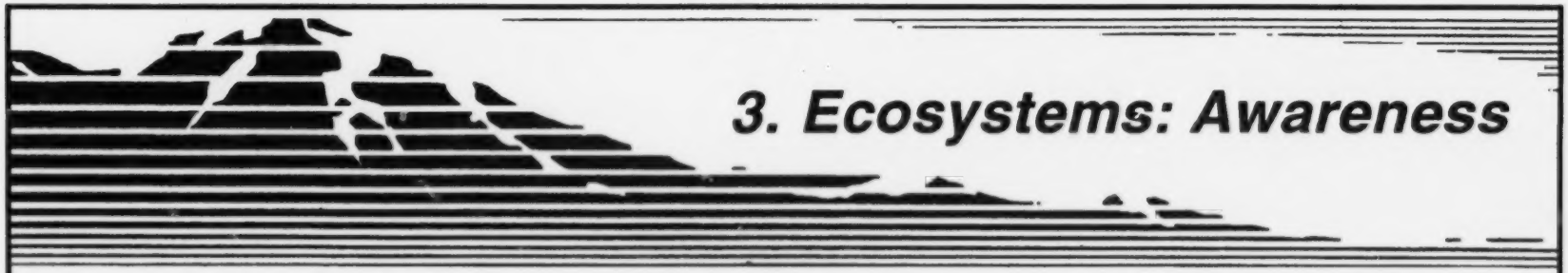

3. Ecosystems: Awareness

Choose one of the following.

FIRST

Listen to some songs about nature and its creatures. You might try "Spin, Spider, Spin," or another album of nature songs.

THEN

Pretend you have become an animal. Think about your life. What kind of animal are you? What kind of biome do you live in? What plants and animals share it with you? What do you eat? What does your skin feel like? What should you be careful about? What do you do when it rains?

- Draw a picture of your animal home—maybe from the inside, or maybe from your doorway, looking out at your neighborhood.
- Write a story about your life as an animal.

OR

Discover the coastline ecosystem. Try to find

See along the Shore by Millicent E. Selsam

The Beachcomber's Book by Bernice Kohn

Along the Seashore by Margaret Waring Buck

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3. Ecosystems: Awareness *(continued)*

Take or imagine an observer's walk. Go slowly, and watch with keen eyes.
On the way back notice things you missed the first time.

Cut photos from a magazine or draw pictures of some of the things you saw.

- Create a collage with the pictures.

Walking on the beach
looking for the perfect shells
I almost did not see
the intricate patterns
and broken beauty
of the fragments.

Sam Keen

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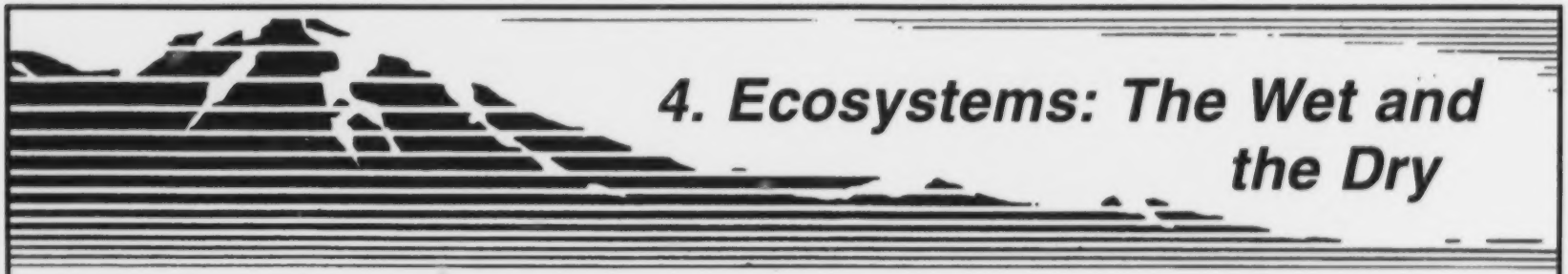

4. Ecosystems: The Wet and the Dry

Read about the sea in a book such as one of these:

The Bottom of the Sea by Augusta Goldin
The Coral Reef: What Lives There by Gilda Berger
From Shore to Ocean Floor by Seymour Simon

Pretend you are one of the creatures you have read about.

- Write a story, poem, or song about your life.

  Draw pictures of some of the other creatures you live with.

  OR

- Read about dry places in a book such as one of these:

  Desert Voices by Byrd Baylor
  Creatures and Features of the Desert by Rita H. Dickinson
  The Desert Is Theirs by Byrd Baylor
  The Gentle Desert by Laurence Pringle
  Along Sandy Trails by Ann Nolan Clark

- Create a diorama or mural to show an interesting dry place.

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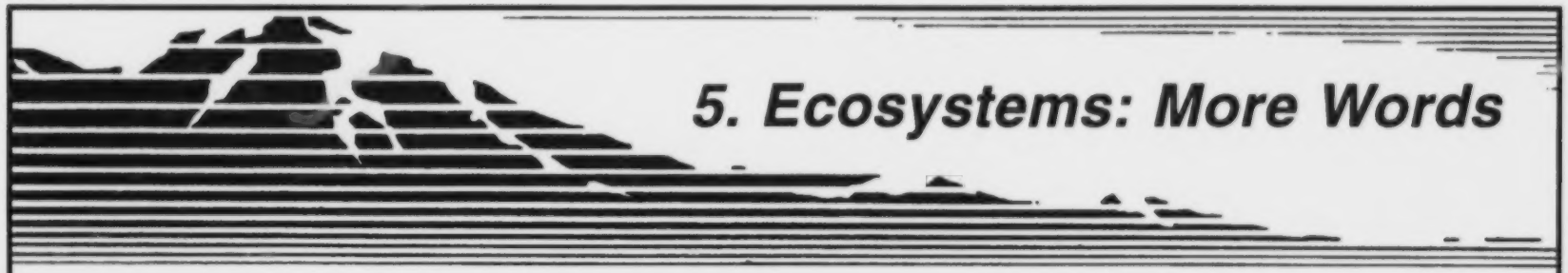

5. Ecosystems: More Words

Jack Sprat could eat no fat.
His wife could eat no lean.
And so betwixt them both, you see,
They licked the platter clean.

traditional nursery rhyme

Imagine what would happen if all creatures ate the same thing.

Words to learn:

Food chain	**Predators**
Producers	**Solar**
Consumers	**Fungi**
Decomposers	**Scavengers**
Conversion of energy	

- Make a picture. Show at least 5 things in a food chain. Show what eats what. (Will your pictures be in a straight line or in a circle?)

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6. Ecosystems: Photosynthesis

Plants can make their own food. How do they do it?

Read about photosynthesis. Learn the meaning of these words:

Chlorophyll	**Glucose**
Oxygen	**Cycle**
Carbon dioxide	**Solar energy**

Then choose a plant that you like.

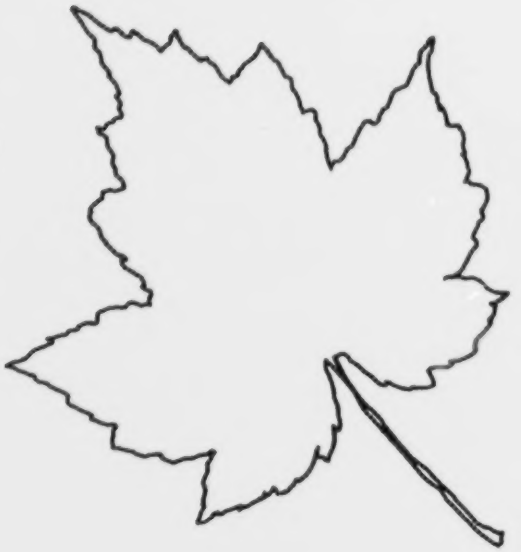
- Draw a picture of the plant on a large sheet of paper. Show how it produces food energy and gives us oxygen to breathe.

  OR

  Find out about 4 different kinds of food that plants can make within themselves.

- Give a talk to your class about food producers. Show examples of those 4 to the class.

  Next time you notice a plant, think about how busy it is. You might even tell it thank you!



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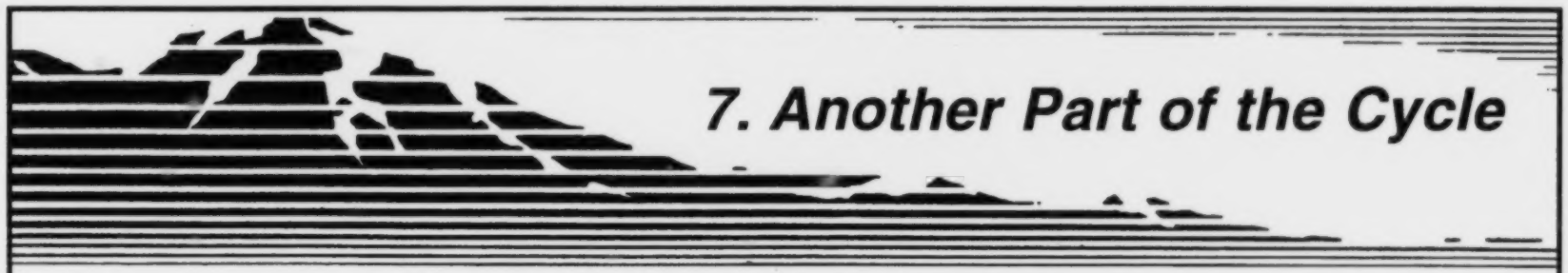

7. Another Part of the Cycle

Dead things can be as important as living things. Their stored body energy feeds many tiny, hungry organisms, which then create new soils to grow new plants.

Find a book such as one of these:

Our Tiny Servants: Molds and Yeasts by Bernice Kohn

From Food to Fertilizer: The Role of Excrement in the Life Cycle by Charles Clay Dahlberg

Life and Death by Herbert Zim and Sonia Blecker

The Dead Tree by Alvin Tresselt

Dead Bird by Margaret Wise Brown

- Draw a picture or write a story about how important dead things are.

OR

- Make up a recipe for plant energy.

Next time you see a dead plant or animal, tell it thank you, too (but leave it alone).

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8. Ecosystems: The Sun

Find out about Earth's important star, the sun, by reading one of the following:

Energy from the Sun by Melvin Berger

Dining on a Sunbeam by Phyllis S. Busch

Many people have appreciated the sun as a god, as "Giver of Life." Find out about this belief.

Read some poetry written by American Indians, or read about other cultures in *A Way to Start the Day* by Byrd Baylor.

- Write your own poem to the sun.

OR

We can get electricity to run our machines from the sunlight. See what you can find out about solar energy.

- Share what you learned with your class. Try to find a solar cell to show.

  A possible reading source: *Sun Power* by Norman F. Smith

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38

9. Ecosystems: Symbiosis

Learn about symbiosis.

These books will help you:

Symbiosis: A Book of Unusual Friendships by Jose Aruego

Living Together in Nature by Jane E. Hartman

Hidden Animals by Millicent E. Selsam

Anywhere in the World: The Story of Plant and Animal Adaptation by Irma E. Webber

A Place to Live by Jeanne Bendick

- Create an imaginary interview with an animal you learned about. Prepare at least ten questions.

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10. Adaptation

Find out about adaptation. Ask your librarian for help.

- Create a picture book showing how certain creatures have adapted to environmental conditions. Be sure to compare

  bird feet, wings, beaks, eyes

  animal feet, teeth

  the front limbs of different animals and insects

  At the end of the book invent an imaginary "adapted" creature. (Explain how it has adapted itself.)

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11. Populations

What is the population of your class right now? _____

What is the population of your school? _____

How many children? _____

Teachers? _____

Others? _____

What is the population of your community? _____

What is the population of your state? _____

Why are some people concerned about world population? _____

What is the "population explosion"? _____

- Draw a family tree to show the population of your family. Include your parents, grandparents, aunts, uncles, cousins, nieces, nephews . . . as many family members as you can find.

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12. Pollution: Trash

Investigate the problem of garbage. Read one of these books or find another on this topic:

Too Much Garbage by Patricia lambar

What Happens to Garbage? by Rona Beame

Let's Go to a Recycling Center by Michael Chester

About Garbage and Stuff by Anne Zane Shanks

I Love Old Clothes by Mary Ann Hoberman

Notice your family's "throw-away" habits.

- Make a list of ways the throw-aways could be recycled.

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13. Pollution: Water

Who hears the fishes when they cry?
Henry David Thoreau

Read about water pollution.

Our Dirty Water by Sarah M. Elliot

A Sea of Troubles by J. J. McCoy

The Town that Launders Its Water by Leonard A. Stevens

Easy Experiments with Water Pollution by Harry Sootin

Three Drops of Water by Sigmund Kalina

At Last to the Ocean by Joel Rothman

The Water We Drink by Enid Bloome

- Create a mural explaining the water cycle. Show the steps in the cycle where water can become polluted. Invent a way to stop the pollution.

Next time you have a drink of water, think of all the living things that have shared that water with you. Think about the water your grandchildren will drink. Will it be healthful?

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14. Pollution: Air

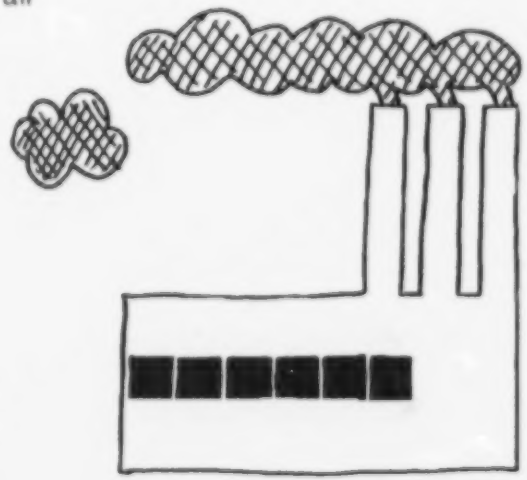
Research our air using these or other books in your library:

Who Will Clean the Air? by Thomas B. Perera

The Air We Breathe by Enid Bloome

Find out what causes polluted air around your community.

- Prepare a poster to show what people can do to make our air cleaner. (Use your wildest, most creative ideas.)



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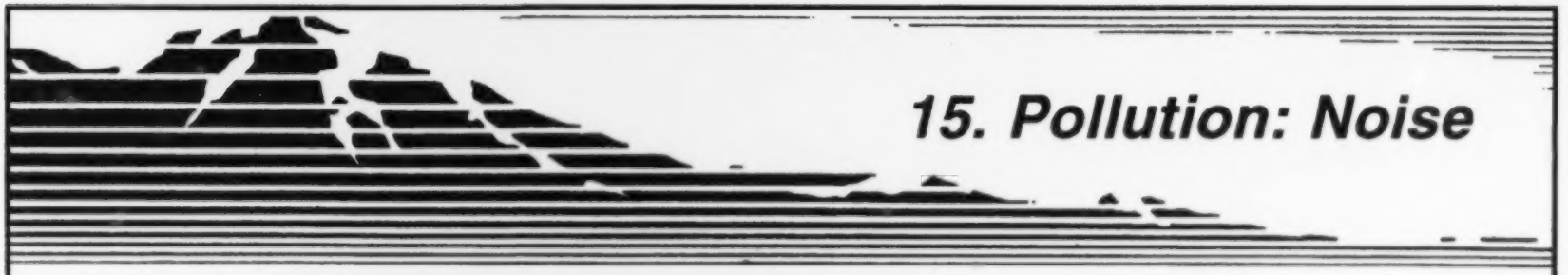

15. Pollution: Noise

Sound has force.

Discover its vibrations. Feel a guitar or piano as it is being played. Touch a vibrating wire. Touch your stereo speakers.

Learn how your ears work. You might send for "Noise and You" from Channing L. Beter, Inc., South Deerfield, MA 01373.

Notice how your body reacts to different sounds.

- Give a demonstration to your class about different sounds and vibrations. Which are alike and which are different?

(continued)

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15. Pollution: Noise *(continued)*

READ

High Sounds, Low Sounds by Franklyn M. Branley

First Book of Sound by David C. Knight

The Listening Walk by Saul Showers

The Other Way to Listen by Byrd Baylor

City Rhythms by Ann Grifalconi

THEN

- Write a poem about sounds.

OR

Find a place in your neighborhood where you can hear sounds that are pleasing to you. Perhaps it is best at a certain time of day.

- Tape record the sounds. Collect them over several days. Play the recording for yourself later . . . maybe when you are studying or just before you go to sleep. Bring your tape to school for your class to hear.

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16. Word Fun

With a friend, study a specific environmental topic, such as water pollution or desert ecosystems. Share the same books.

- Organize a hangman tournament.

Each person makes a secret list of 10 vocabulary words. Include their definitions. A player gets 10 points for guessing the word and 5 more points for knowing the definition.

OR

- Make a crossword puzzle for each other to solve.

OR

- Create "Word Search" games for each other, using definitions as a guide. For example, if you were studying microscopic ocean life, you might say:

  a. one-celled plant with silica cell

  b. tiny drifting plants and animals that float with the current

B	J	D	P	Q	M	J	H
L	G	I	F	I	U	W	A
P	L	A	N	K	T	O	N
F	O	T	A	W	P	L	E
D	R	O	L	P	O	E	P
K	P	M	R	E	D	C	P

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17. Attitudes

When people live close to the natural world, sometimes the wild creatures and plants are more like family than strangers.

Learn something about the attitudes of American Indians (or other native peoples) toward nature. Some reading ideas:

The Desert Is Theirs by Byrd Baylor

Hawk, I'm Your Brother by Byrd Baylor

Coyote Cries by Byrd Baylor

Beyond the High Hills: A Book of Eskimo Poems by Knud Rasmussen

What can we learn from such people?

Pretend you grew up in such a world and then moved to a city.

- Express your feelings in a story, poem, or song.

  OR

  Is there any animal or plant (a tree, maybe?) in your life that is special to you?

- Tell about the animal or plant in a story. Or write a letter and tell that plant or animal how you feel.

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18. Understanding the Issues

Locate one of the following groups in your area. Ask a member to speak to your class:

Sierra Club

Audubon Society

Friends of the Earth

Zero Population Growth

Fish and Wildlife Service

Air Quality Control

City Planning Department

Nature Conservancy

Have at least five good questions ready to ask. Be sure you leave time for your classmates to ask questions also.

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19. Endangered Species

- Organize an exhibit that tells about at least 5 endangered species. Include

  Books

  Filmstrips

  Pictures

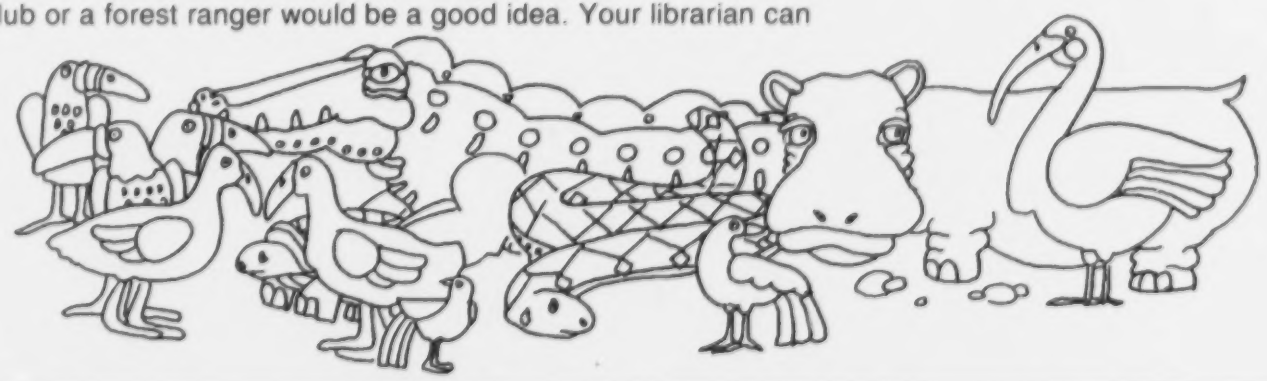
  Audiotapes of songs about or sounds of animals

  Posters

  Charts

  News articles

Invite someone to talk to your class about endangered species. A member of the Sierra Club or a forest ranger would be a good idea. Your librarian can help you.



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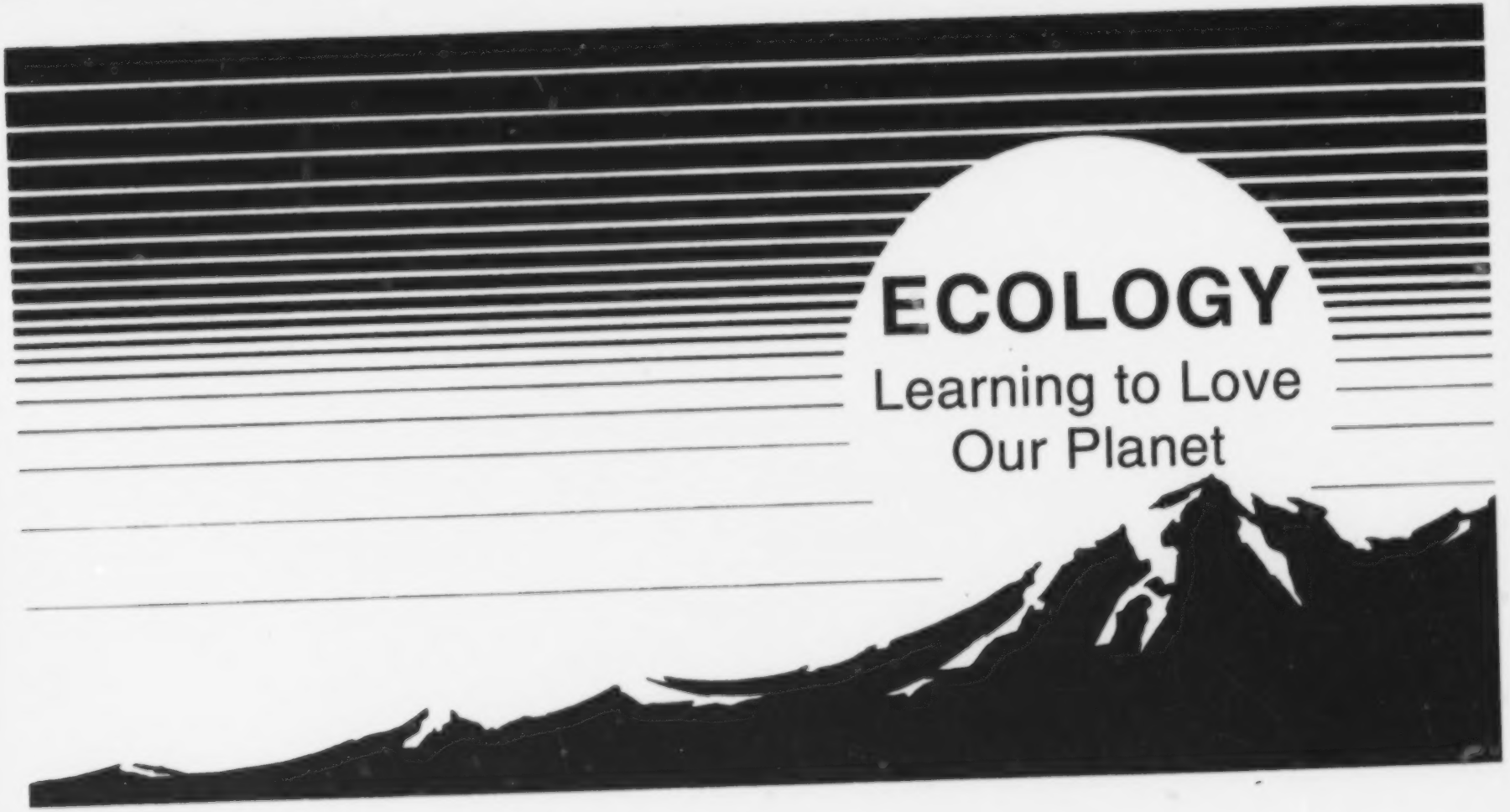

ECOLOGY

Learning to Love Our Planet

UNIT II

Name _____ Date _____

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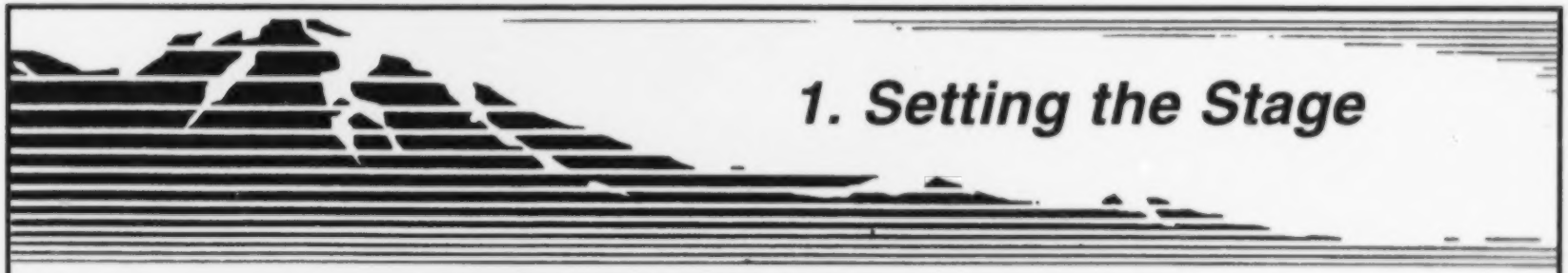

1. Setting the Stage

Imagine that you have just been beamed down to Earth from another planet. Your mission is to explore Earth's life-forms. With your tape recorder (your communication with your spaceship) visit an area near your home or school.

Move slowly, sit quietly, watch closely. Describe every sign of life you see or hear . . . the insect by the rock, the bird that flies by. Record possible signs of previous life (a footprint, a bird dropping, a gum wrapper).

Look with fresh eyes. Pretend you know nothing about what you are describing. Speak into the tape recorder softly. Try not to disturb what is there. (You might want to draw some sketches of what you see or photograph some of your "strange" sightings.)

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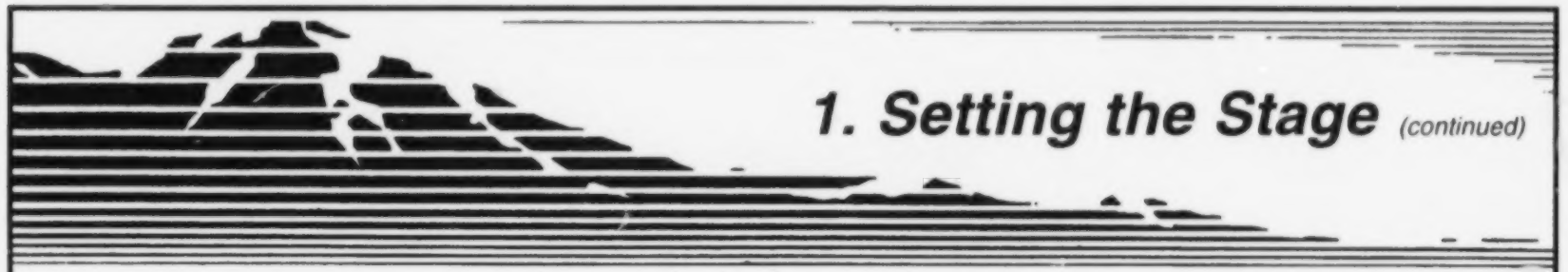
65



1. Setting the Stage *(continued)*

- Organize an exhibit of posters, books, videos, and so on, showing the beauty and wonder of planet Earth. Include your tape and cassette player.

For some good ideas, read:

Reading the Landscape by May T. Watts

All Upon a Sidewalk by Jean George

Exploring as You Walk in the City by Phyllis S. Busch

In this 20th century, to stop rushing around, to sit quietly on the grass, to switch off the world, and come back to the earth, to allow the eye to see a willow, a bush, a cloud, a leaf, is an unforgettable experience.

Frederick Franck
The Zen of Seeing

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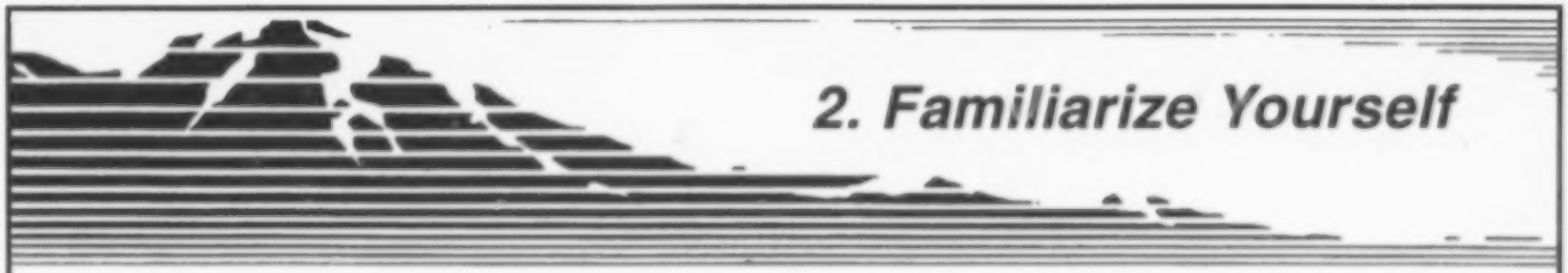
67



2. Familiarize Yourself

- Each week for 3 weeks, read 2 articles about the environment and write a summary for each one. State the main idea and supporting points of each article. State whether or not you feel the article is based on fact.

Be sure to note the following: Author and title of the article, title of the magazine or newspaper, date of publication, page numbers of article.

Example: Earle, Sylvie. "The Gentle Giants," *National Geographic* (January 1979), pp. 2–17.

We travel together, passengers on a little spaceship, dependent on the vulnerable supplies of air and soil, preserved from annihilation only by the care, the work, and I will say, the love, we give our fragile craft.

Adlai Stevenson

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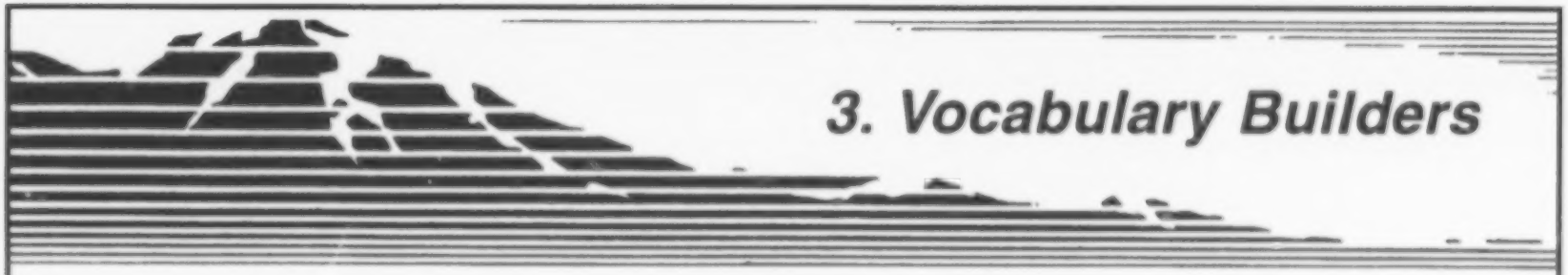

3. Vocabulary Builders

- Design a game that teaches the meaning of these ecology words:

Acid rain	**Green plants**
Adaptation	**Habitat**
Bacteria	**Herbivore**
Biome	**Omnivore**
Carnivore	**Organism**
Climax condition	**Parasite**
Community	**Pollution**
Consumer	**Population**
Decay	**Predator**
Ecology	**Producer**
Environment	**Saprophyte**
Food cycle (food web)	**Scavenger**

Share your game with the class.

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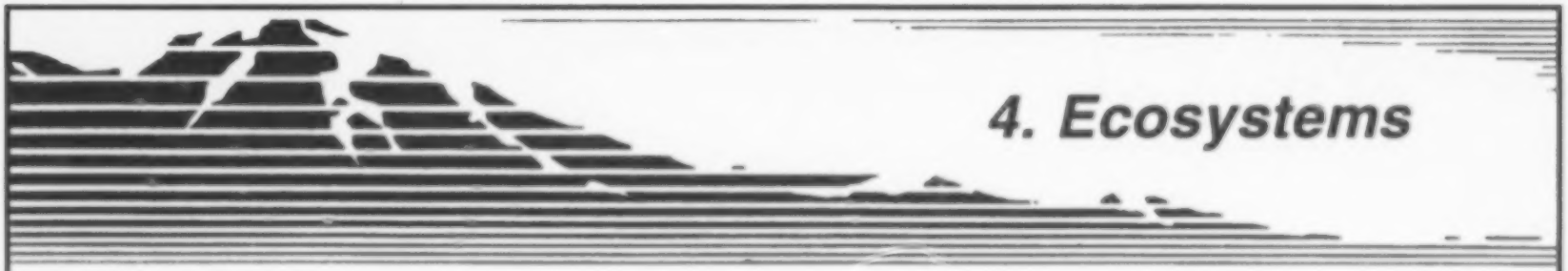

4. Ecosystems

Nature will bear the closest inspection. She invites us to lay our eye level with her smallest leaf, and take an insect view of its plain.

Henry David Thoreau

Ecosystems can be very large (as large as our whole planet) or very small (as small as a drop of water).

- With some friends, create a small ecosystem of your own. You'll need a large jar or maybe a "leaker" from an aquarium store. Get some ideas from

  Small Habitats by Lilo Hess

  Terrariums by John Hoke

  The Complete Book of Flowerpot Ecology by Anna B. and Elizabeth Gitter

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5. Small Worlds

So, naturalists observe, a flea
Hath smaller fleas that on him prey
And these have smaller still to bite'm
And so proceed, ad infinitum.

Jonathan Swift
(Find out the meaning of *ad infinitum*.)

There are tiny worlds all around us of which we are not even aware. Discover some of them.

- Write a song or poem about these tiny creatures, or create a picture that shows their world.

See

What's under a Rock? by Robert Gannon

The Hidden World: Life under a Rock by Laurence Pringle

What We Find When We Look under a Rock by Francis L. Behnke

Life in a Drop of Water by George L. Schwartz

A World in a Drop of Water by Alvin and Virginia Silverstein

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6. Cycles

More than anything else, the science of ecology teaches us about cycles.

We are very much a part of the never-ending circles of change that flow around us.

- Design an illustrated Circle Book.

  Cut pages of poster board, punch holes in the left side, and bind them loosely with string so that the pages turn continuously, with no beginning and no end.

  On separate pages, show the stages of transformation for each of these:

  the water cycle

  the carbon cycle

  the nitrogen cycle

  the phosphorous cycle

  the energy cycle

At what points are people seriously interfering with these cycles? On the backs of the appropriate pages, show the ways people interfere.

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7. Habitats

One man's ceiling is another man's floor.

Paul Simon

Research the 6 zoological realms.

FIND OUT

Why life-forms within each realm have developed in a distinct way.

Why the boundaries are breaking down in modern times.

- On a map of the world show these regions with some of their characteristic inhabitants.

OR

- Create a book for primary-age children showing the plant creatures that make their homes in various habitats—lakes, ponds, marshy wetlands, streams, deserts, estuaries, tundras, forests, shorelines, tidal pools, and so on.

  See *Atlas of Wildlife* by Jacqueline Nayman

8. Biomes

Survey your classmates to determine who has traveled through or lived in different biomes.

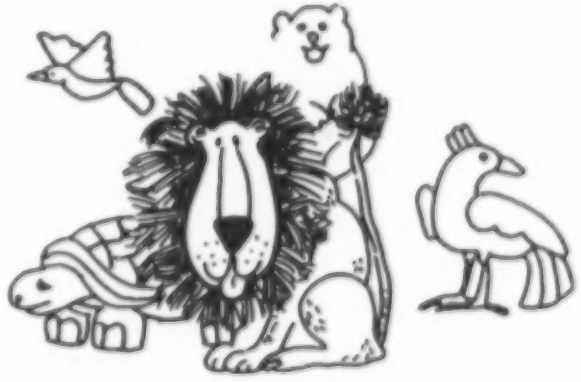
- Graph your findings.

  OR

- With some friends, create mobiles showing animals and plant life that live in the various kinds of biomes for an "around the world" display.

  OR

- Present a debate on the statement "People will live in underwater habitats by the year 2050."



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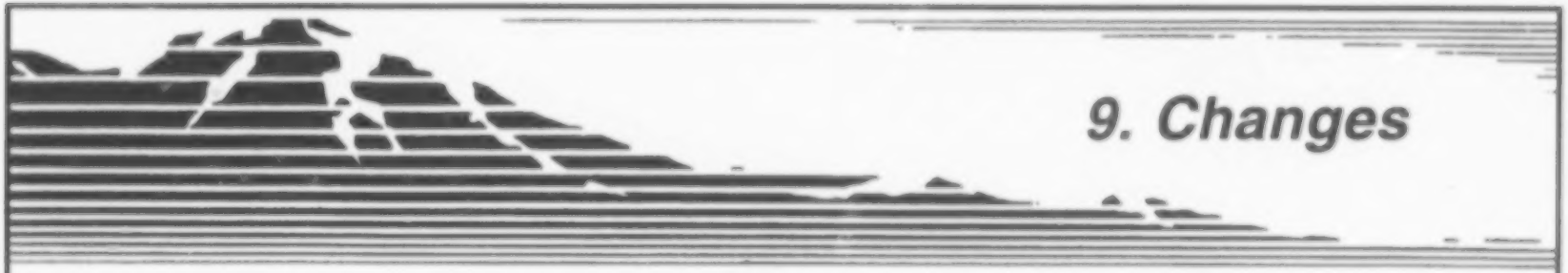

9. Changes

Discover the relationship between the *balance of nature* and *ecological succession*.

What are some factors that can bring about a change in an ecosystem?

Classify these factors as causing either (1) slow and natural change or (2) sudden and traumatic change.

In what ways do plants and animals react to the changes you listed above?

- Make a chart that displays your information.

Look abroad thro' Nature's range.
Nature's mighty law is change.
Robert Burns

(continued)

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9. Changes *(continued)*

- Create an illustrated picture book showing either a slow change (e.g., from glacier to lake to forest) or a rapid one (e.g., recovery from a fire or volcano).

Good resources:

Ecology Out of Joint: New Environments and Why They Happen by Lorus J. Milne and Margery Joan Greene

Birth of a Forest by Millicent E. Selsam

A Forest Is Reborn by James R. Newton

Birth of a Pond by John Hamberger

From Pond to Prairie by Laurence Pringle

Learn how humans have altered the ecosystems around us.

A good source is *Man's Mark on the Land: The Changing Environment from Stone Age to the Age of Smog, Sewage, and Tar on Your Feet* by Arthur S. Gregov

Hypothesize about future changes.

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10. Symbiosis

Have you ever seen a tick on your dog? Mistletoe growing on a tree? What about the moth who spends its life in a sloth's fur?

Some plants and animals need a partner or host to live. These relationships can help provide food, cleaning services, or shelter and are called either *symbiosis* or *parasitism*.

In a symbiotic partnership, both partners are helped. In a parasitic relationship, only one is helped; sometimes one is harmed or even killed.

Distinguish between mutualism, commensalism, and parasitism.

- Create a book giving information about these types of relationships. Include your observations of how humans may be part of these relationships.

A starting place:

Natural Partnerships: The Story of Symbiosis by Dorothy Shuttlesworth

Plants and Insects Together by Dorothy Patent

Strange Partners by Sigmund A. Lavine

Unusual Partners: Symbiosis in the Living World by Alvin Silverstein

11. Food Webs

You will need: 1 ball of string; small cards for each player

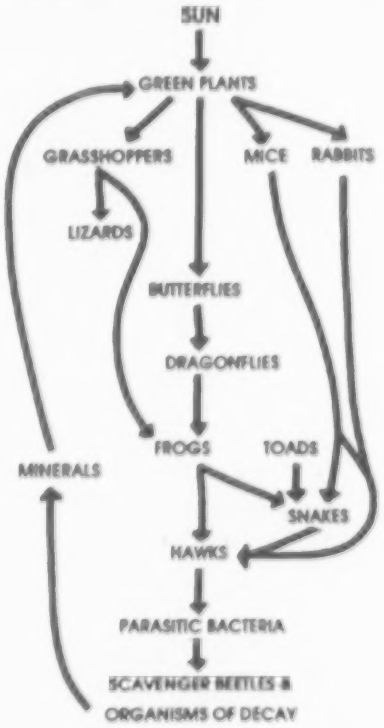
Choose an ecosystem. For instance, you might choose a desert ecosystem.

Pass out small cards to about eight friends. Have them write the name of a plant or animal that can be found in a desert ecosystem on each side of the card. Have each player turn up one side of the card.

Give one person a ball of string. The first person should hold on to the end of the string and pass the ball of string to someone with a card that has the name of an animal that would eat the plant or animal that is on the first person's card. The next person holds on to the string, unravels the ball, and passes it to another person who has an animal that would eat the second animal.

The object of the game is to pass the ball of string to every person that has a card with the possible eater of each plant and animal. Don't miss any possibility. (It gets very complicated, just like a food web in nature.)

Turn the cards over and try another food web. What might happen if one of the strands is broken? How many organisms are affected?



Simplified Food Web

Note: The sun acts on all of these directly or indirectly.

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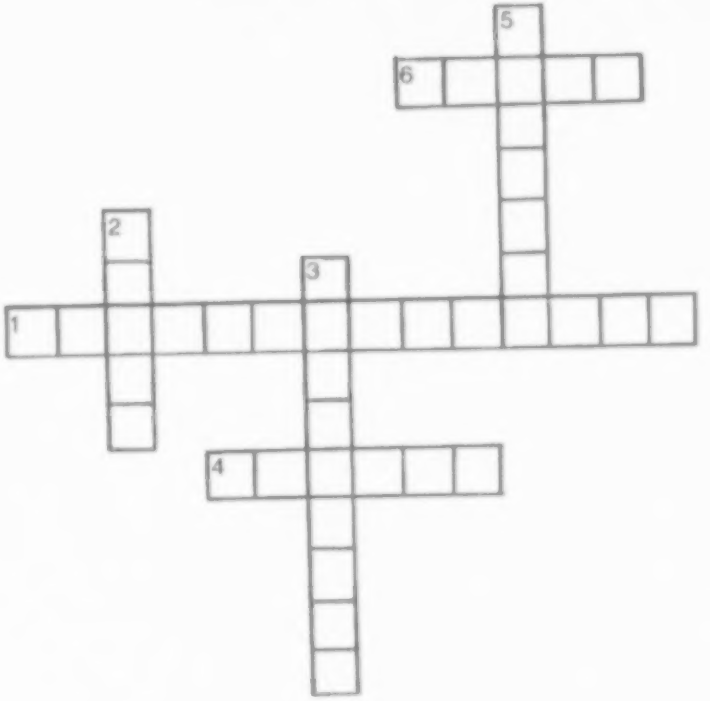
12. Crossword

ACROSS:

1. The process by which green plants create food energy, powered by the sun.
4. The kind of biotic community that tends to become stable for a long period of time.
6. The role an organism plays within its community; its "occupation."

DOWN:

2. A major land ecosystem named for its dominant kind of plant life, such as grassland or desert.
3. A close association between two unlike organisms that may benefit one or both partners.
5. The area where two ecosystems meet and blend together in a dynamic way, for example, the shore of a pond.



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13. Endangered Species

Choose an endangered animal. Research the animal thoroughly; use several sources.

- Write a speech about this animal. Then tape your speech and draw on a blank filmstrip or make a flip chart to illustrate the tape.

Suggested animals:

American crocodile
Atlantic salmon
Bighorn sheep
Black toad
Blue whale
Blue pike
California condor
Canadian goose
Eastern brown pelican
Florida panther
Florida sea cow
Gila trout
Great white heron
Green turtle
Grizzly bear
Hawaiian monk seal
Kaibab squirrel
Key deer
Mexican duck
Musk ox
Peregrine falcon
Prairie chicken
San Joaquin kit fox
Southern sea otter
Southern bald eagle
Timber wolf
Trumpeter swan
Tule elk
Utah prairie dog
Whooping crane

God has lent us the earth for our life.
It is a great entail.
It belongs as much to those who follow us as it does to us;
And we have no right, by anything we may do or neglect to do
To involve them in unnecessary penalties
Or to deprive them of the benefit
Which we have in our power to bequeath.

John Ruskin, 1819–1900

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14. Adaptation

Extreme Environments

Some habitats present such extreme circumstances that people who live there must be very resourceful to survive at all. Learn something about the lives of people who live in arctic, barren desert, undersea, or space environments.

Compare and contrast how humans have adapted to living in extreme environments.

OR

Select five animals or birds and classify their adaptive features according to

Structure (external)

Physiology (internal)

Behavior

OR

Find out what *convergent adaptation* is.

Choose three pairs of animals or plants that exemplify convergent development.

- Create a poster. With arrows and labels (or some other method) point out the related characteristics.

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15. Treasure Hunt

i thank You God for most this amazing day:
for the leaping greenly spirits of trees and a
blue true dream of sky: and for everything
which is natural which is infinite which is yes.

e.e. cummings

- Work with three or four classmates to prepare an eco-treasure hunt for the rest of the class to play. The idea of the game is to be guided by notes directing you from place to place.

  Example: Starting off, the first note might say: "I'm big and beautiful. I supply food for wildlife and put oxygen into the air. Sometimes a raccoon stays with me. My buds have little caps on them." (an oak tree)

  When the class finds the oak they will find another message.

  You and your group must design the trails around the school grounds and write the notes.

Have Fun!

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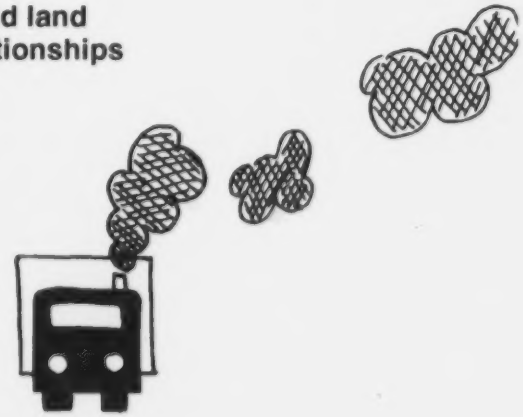
16. Pollution

- Make an in-depth report on one of the following. Design visuals to show your findings. Taking into consideration what you learn, make your own predictions.

  - **Mercury pollution**
  - **Water pollution**
  - **Air pollution**
  - **Land pollution**
  - **Crop dusting and its effects on the environment**
  - **Transportation and environmental impact**
  - **Acid rain**
  - **Pesticides**
  - **Oil spills**
  - **Noise pollution**
  - **Erosion and land use relationships**
  - **Radiation**

Only in the last three years I was in office . . . did I see [conservation] as a whole piece. We'd erred in thinking environment was simply a matter of managing natural resources. What had to be managed [were humans themselves].

Stewart Udall
(in looking back over his term as Secretary of the Interior)



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17. Wildlife Conservation

Something will have gone out of us as a people if we ever let the remaining wilderness be destroyed . . . if we pollute the last clean air and dirty the last clean streams and push our paved roads through the last of the silence.

Wallace Stegner

Find out why the killing of coyotes is such a controversial topic.

- Recruit some friends and organize a debate among

  a cattle rancher

  a sheep rancher

  a farmer

  a conservationist

  Ask each of them to propose a possible solution to the differences. Get information that is published by the groups they represent. Your librarian can help you find addresses for their associations. You can also find articles in trade magazines related to these groups. (Laurence Pringle's *The Controversial Coyote* can get you started.)

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18. Sea Life

The great whales that have roamed the oceans for millions of years may soon become extinct: one is killed every 14 minutes.

- Plan a campaign aimed at protecting the whale. Include in your plan your sequence of events, samples of posters and flyers, and a description of your target audience.

  See

  Whale Watch by Ada and Frank Graham

  Sounds in the Sea by Francine Jacobs

  Whales and other Sea Mammals (Time-Life) by Thomas Dozier

  The Sea around Us by Rachel Carson

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19. Taking a Stand

Take a stand on an issue concerning the environment!

- Write to a newspaper or an elected representative on an environmental issue. You can find names and addresses in the library. Follow business letter format, using a heading, an inside address, a greeting, the body of the letter, and the closing.

  Enlist others in your concern by creating a logo and slogan. Design bumper stickers, T-shirts, and posters.

In defying nature, in destroying nature, in building an arrogantly selfish, [human]-centered, artificial world, I do not see how [we] can gain peace or freedom or joy.

Marston Bates

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20. Ecology: Careers

Ecology is an interdisciplinary science.

If an ecologist wanted to:	**He or she could ask the help of:**
analyze population growth trends	a. _____
study the relationship between weather and animal behavior	b. _____
clean up Lake Erie	c. _____
learn whether crowding increases stress	d. _____
study the effects of erosion on plants and animal life	e. _____
study the correspondence between plant and animal cycles	f. _____

Choose from geologist, climatologist, phenologist, psychologist, limnologist, computer scientist.

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21. Ecologists

Since the middle of the nineteenth century, when the harmful effects of the Industrial Revolution on America's wilderness were becoming obvious, voices have been raised in protest. Some famous ecologists fought to stop the destruction. Their lives made a difference.

Research the diverse group of ecologists below and match them with their accomplishments. Some good sources are

Pioneers of Ecology by Donald W. Cox

Heroes of Conservation by C. B. Squire

Guardians of Tomorrow by S. Carl Hirsch

Great American Naturalists by Ruth Allison Coates

They Loved the Land by Bennet Wayne (editor)

A. George Perkins Marsh (1801–1882)
B. Paul Ehrlich (1933–)
C. John Muir (1838–1914)
D. Henry David Thoreau (1817–1862)
E. Rachel Carson (1907–1964)
F. Frederick Law Olmstead (1822–1903)
G. Jacques-Yves Cousteau (1910–)
H. John James Audubon (1785–1851)
I. Ian McHarg (1920–)
J. Gifford Pinchot (1865–1945)
K. Theodore Roosevelt (1858–1919)
L. George Washington Carver (1860–1943)

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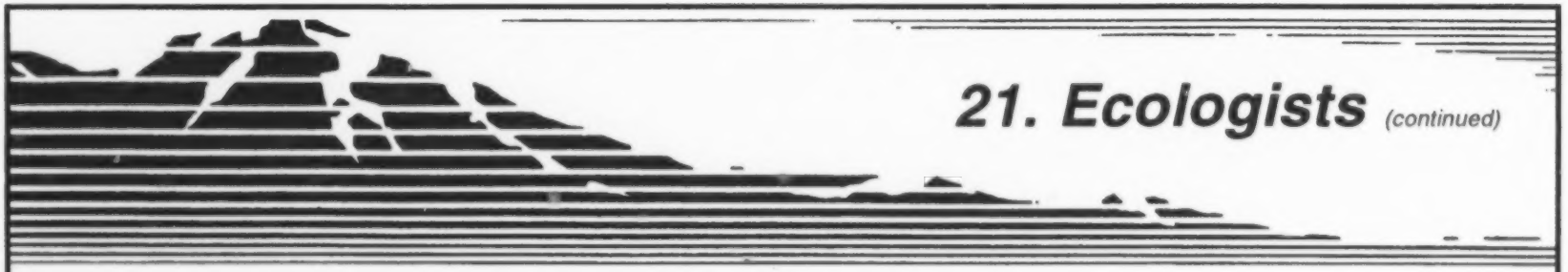

21. Ecologists *(continued)*

____1. A *biologist* originally interested in the population control of animal species, this professor became convinced that the basic cause behind all environmental problems was too many people on an overcrowded planet—especially Americans, whose lifestyle was so destructive to ecosystems. Population control is stressed in the book _____.

____2. Though known for many other exploits, this *lawyer* and American leader also loved the outdoors and used his power to stop many abuses in the management of our natural resources and wildlife. He battled business interests and succeeded in setting aside millions of acres of land for national parks, game preserves, and monuments, including the Grand Canyon. He wrote _____.

____3. Growing up on the seacoast gave this person an enduring fascination with the sea, which led first to a career as a *navy officer* and later, after retirement, to a life of undersea exploration. He sounded a warning that pollution was already upsetting the oceans' fragile ecology, upon which all life ultimately depends. To teach the public he wrote _____ and has also made many _____.

____4. This strong-minded *forester* became a politician and appeared just in time to stop the depletion of American woodlands, fighting hard for active government control of forests and natural resources to keep them productive for centuries to come. He stressed scientific forest management, helped found the Yale School of Forestry, and started the national conservation movement. He wrote _____.

(continued)

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21. Ecologists *(continued)*

____5. This shy, lonely boy grew up to be a *lawyer,* an unsuccessful businessman, and a diplomat, but he is best known as a scholar whose classic book showed humans to be one part of a vast network of animals, plants, insects, soils, water, and weather. This book, which pointed out humans' destructive effects on the harmonies of nature, became the foundation of the new science of ecology. This man also helped found the Smithsonian Institute. He wrote _____ _____.

____6. This quiet *biologist,* whose life was devoted to studying nature's intricate cycles and its web of creatures and plants, wrote fascinating books about the sea. In one final book, _____ _____, this scientist wrote passionately about the dangers of chemical pesticides and other contaminants that could threaten all life in earth. This person wrote _____ _____.

____7. A farmer's son with an early love for inventing machines, this energetic and fervent *naturalist* hiked the wilderness areas of the west, fought to save them from commercial interests, and founded the famous Sierra Club. His efforts saved California's Yosemite Valley and the sequoias. He wrote _____.

____8. With a deep love for the primitive, this *artist* sought out the undisturbed areas of America and painstakingly recorded birds and animals in their natural settings. He warned (correctly) that future generations would never see many of them again. He wrote and illustrated _____ _____.

(continued)

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21. Ecologists *(continued)*

____ 9. With little faith in the institutions of society, this *naturalist* spent two years living in a hut in the woods near his home, observing the plants and creatures that lived there, describing them with respect and affection. Considered a misfit for refusing to join the ordinary work-a-day world, this writer and teacher pleaded for the preservation of the natural, untouched countryside. This person wrote _____.

____10. The flamboyant speeches and writings of this *landscape architect* and *city planner* have stimulated people to think about the ecology of city environments and have demonstrated that builders and designers do not have to destroy nature but can work in harmony with it. This person wrote _____.

____11. Born a slave, this *artist* and *botanist* dedicated his life to discovering scientific ways to restore fertility to soil worn out by cotton growing, bringing new prosperity to the South. He traveled in his demonstration wagon directly to the homes of poor farmers to teach them how to care for the land that he loved. At Tuskegee Institute, he wrote many _____.

____12. As a young man in New York City in the mid-nineteenth century, this person longed for the clean air and water of the Connecticut countryside in which he had grown up. After years of traveling, experimental farming, and writing, he was given a chance to take a neglected piece of land in the dirty city and turn it into an oasis—Central Park. He went on to design urban and campus parks across the country. The first person to call himself a *landscape architect*, he was far ahead of his time in his concern for the city environment. He wrote _____
_____.

(continued)

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21. Ecologists *(continued)*

Write for classroom and public information, charts, and filmstrips.

The Cousteau Society, Inc.
870 Greenbriar Circle, Suite 402
Chesapeake, VA 23320
(804)523-9335

Defenders of Wildlife
1244 19th Street, N.W.
Washington, DC 20036
(202) 659-9510

Environmental Defense Fund, Inc.
Attn: Public Information
247 Park Avenue South
New York, NY 10010
(212)505-2100

National Geographic Society
17th and M Street, NW
Washington, DC 20036
(202)775-6701

Rainforest Action Network
Attn: Information Department
450 Sansome, Suite 700
San Francisco, CA 94111
(415)398-4404

Smithsonian Institution
1000 Jefferson Drive, S.W.
Washington, DC 30560
(202)357-2700

World Wildlife Fund, U.S.
1250 24th Street, N.W.
Washington, DC 20037
(202)293-4800

Over the long haul of life on this planet, it is the ecologists, and not the bookkeepers of business, who are the ultimate accountants.

Stewart L. Udall

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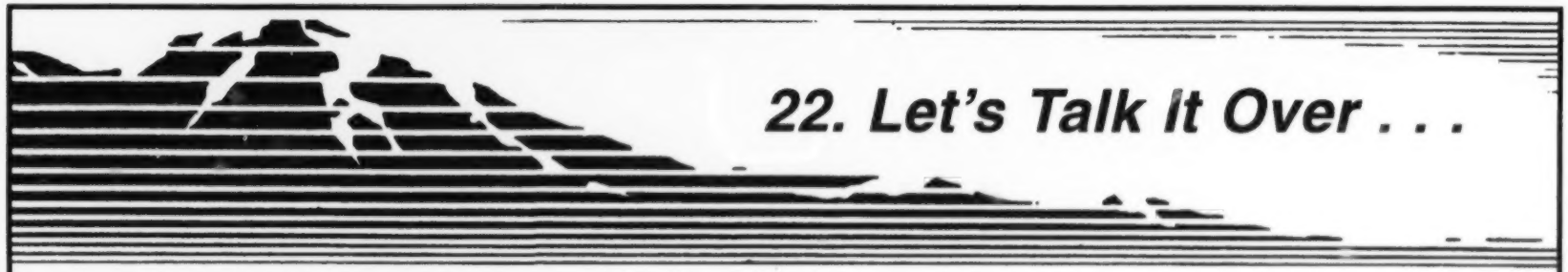

22. Let's Talk It Over . . .

Organize a panel discussion or a "fireside chat" of one of the following groups:

Henry David Thoreau, Gifford Pinchot, and John Muir

Rachel Carson and Paul Ehrlich

George Washington Carver and Gifford Pinchot

John Wesley Powell and John Muir

Members of the Sierra Club and Friends of the Earth

Members of Zero Population Growth and their opponents

Members of Greenpeace and Earth First! and their opponents

Compare and contrast the qualities of the people on your panel.

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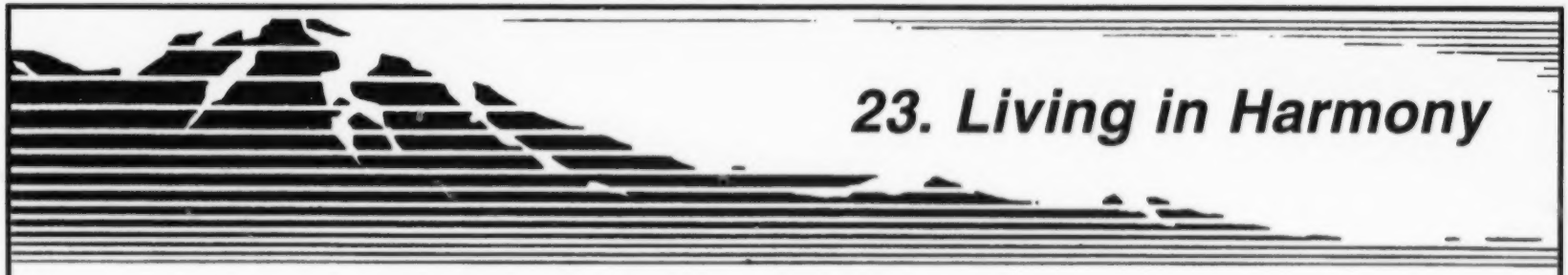

23. Living in Harmony

Although many Inuit kill whales and American Indians killed buffalo, the relationships of these hunters to their environment are considered by many to be different from the relationship of modern whalers and sportsmen to the animals they kill.

Find out about Inuit or some other group that hunts. Explain how their lives are similar to and different from whalers or other commercial hunters.

- Make a chart showing similarities and differences.

OR

- Make a mural depicting Inuit life or the life of the group you have chosen to study.

> *Ecology is an infant just learning to talk, and, like other infants, is engrossed with its own coinage of big words. Its working days lie in the future. Ecology is destined to become the lore of Round River, a belated attempt to convert our collective knowledge of biotic materials into a collective wisdom of biotic navigation. This, in the last analysis, is conservation.*
>
> Aldo Leopold

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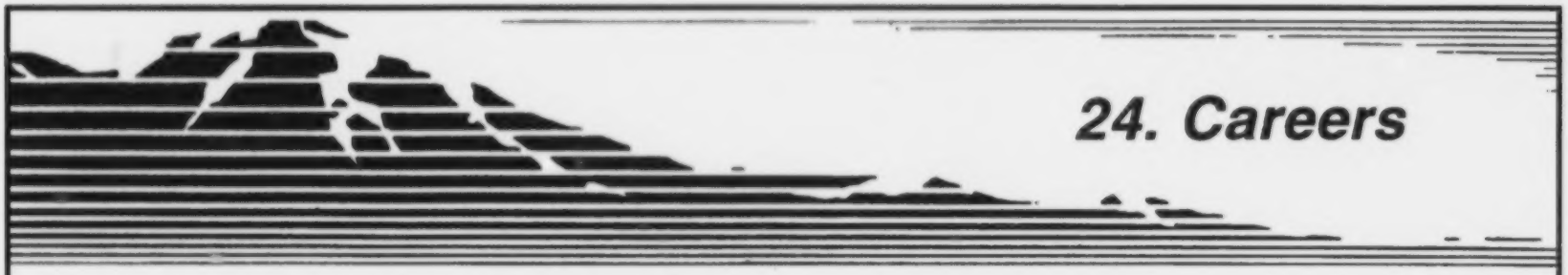

24. Careers

Who will be the Carsons, the Olmsteads, the Carvers, and the Cousteaus of the next generation? Maybe there is a place for you.

Investigate a career in environmental studies.

Career:
Educational requirements:
Duties:
Salary:
Opportunities:
Why you choose this career:

Information sources:

Jobs that Save Our Environment: Exploring Careers by Melvin Berger
Career Education in the Environment: A Handbook, Olympus Research Corporation
Career Opportunities: Ecology, Conservation, and Environmental Control by Walter M. Arnold
Dictionary of Occupational Titles, Occupational Outlook Handbook; Modern Vocational Trends Reference Handbook

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25. Ecology Fair

- Organize an Ecology Fair.

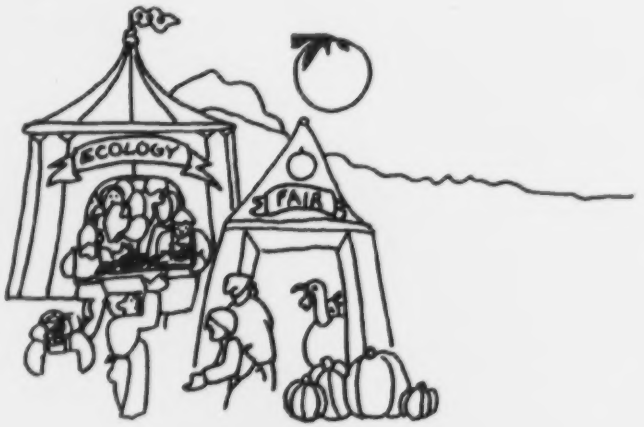
  Show the results of your pollution research.

  Present the tape and filmstrip of the endangered animals.

  Categorize all the products (poems, books, banners, charts, etc.) in a meaningful way. Be sure to include copies of any letters.

  Invite some interested persons.

  Present skits, pantomimes, and songs that encourage concern in your favorite environmental issues.



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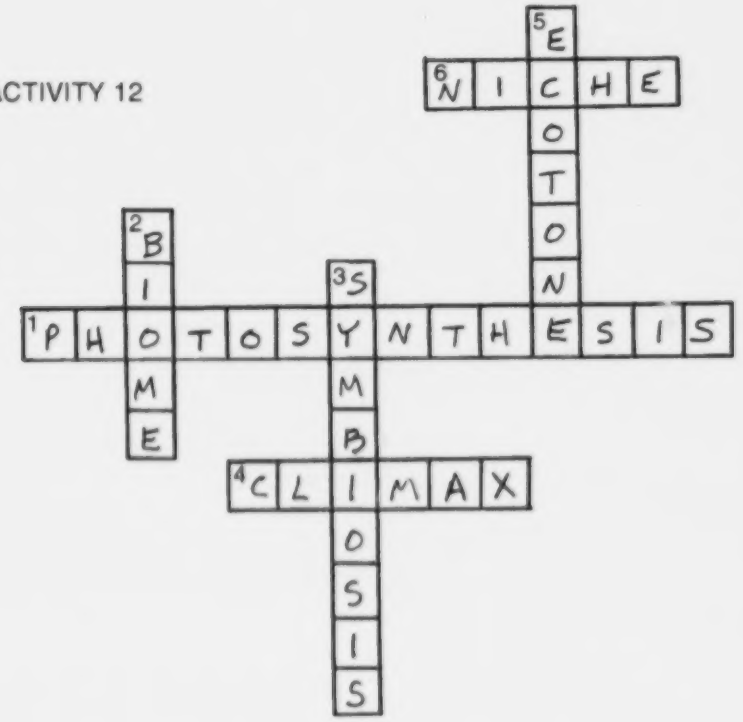
Answer Key

ACTIVITY 12



ACTIVITY 17

a. computer scientist
b. climatologist
c. limnologist
d. psychologist
e. geologist
f. phenologist

ACTIVITY 18

1. Paul Ehrlich; *The Population Bomb*
2. Theodore Roosevelt; *Life Histories of African Game Animals* and others
3. Jacques Yves Cousteau; *The Living Sea,* films for television
4. Gifford Pinchot; *The Training of a Forester, Breaking New Ground*
5. George Perkins Marsh; *Man and Nature: The Earth Modified by Human Action*
6. Rachel Carson; *The Sea around Us; Edge of the Sea; Silent Spring*
7. John Muir; *A Thousand Mile Walk to the Gulf; The Mountains of California*
8. John James Audubon; *Birds in America*
9. Henry David Thoreau; *A Week on the Concord and Merrimack Rivers; Journal; Walden;* and others
10. Ian McHarg; *Design with Nature*
11. George Washington Carver; information bulletins for the public
12. Frederick Law Olmstead; *Walks and Talks of an American Farmer in England* and others

Environmental Organizations

Write for classroom and public information, charts, and filmstrips

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870 Greenbriar Circle, Suite 402
Chesapeake, VA 23320
(804)523-9335

Defenders of Wildlife
1244 19th Street, N.W.
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247 Park Avenue South
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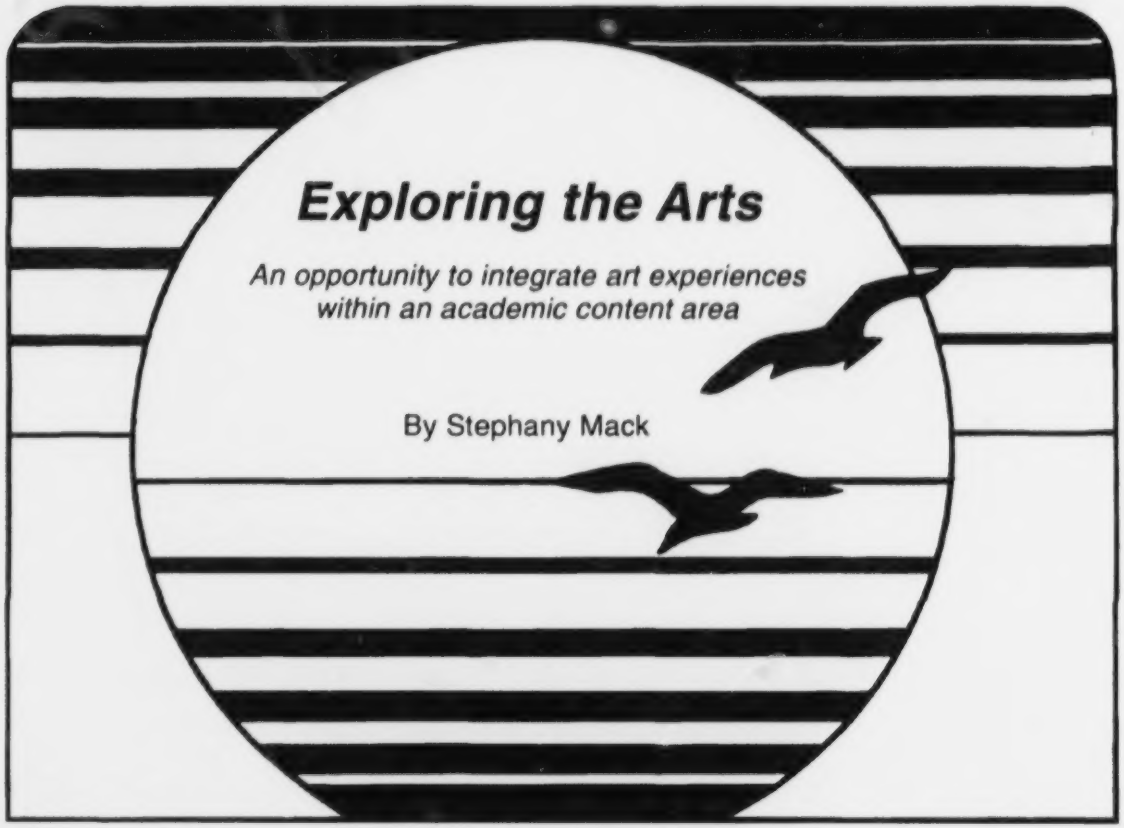

While each component—the self-directed learning units and Exploring the Arts—is a complete and valid learning experience in itself, together they provide a more comprehensive and lasting educational experience for the learner.

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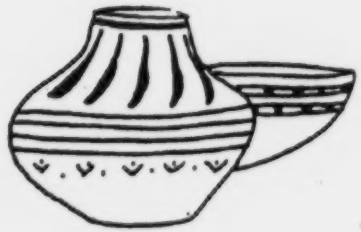
Pottery



Many American Indian cultures produce their own pottery to use for cooking and storing foods and water. They also create beautiful pottery for decorative and artistic purposes.

The Pueblo Indians of New Mexico are famous for their black and red pottery. This pottery is made from clay dug from the ground and fired in pits with recycled organic materials such as animal dung, woods, and leaves.

Read about the process for making black pottery developed by Maria Martinez of the San Ildefonso Pueblo.

Search your community for a contemporary artist who fires pottery using a primitive technique.

Invite the artist to your classroom to talk about the process. Encourage the artist to bring samples, slides, or photos of his or her work.

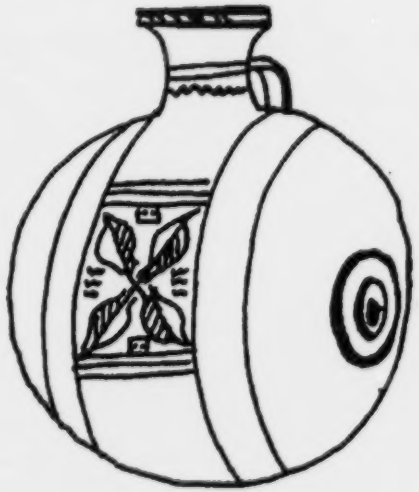
- **Create a clay pot using the coil technique.** Check your library for books with directions about coil pots.

  Investigate the process of primitive firing.

  The primitive firing of clay pots is very inexpensive because nature supplies all of the materials. After you have gathered all of the information, discuss the process with your teacher. If possible, fire your pottery using a primitive technique.

  Supplies

  1. shovels
  2. picks
  3. rakes
  4. work gloves (optional but good to have)
  5. matches (unless you want to rub two sticks together!)



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Inuit Sculpture

The Inuit create beautiful art that clearly reflects the extreme conditions of their environment. The simple tasks of eating, keeping warm, and creating shelters occupy much of their time. As a result, seals, bears, fish, and Inuit hunters are common subjects for their art.

Investigate your library for books with examples of Inuit art. Notice the simple, smooth shapes the Inuit use to express their ideas.

- **With some friends, make an illustrated list of the most common subjects of Inuit art.** Display the list in your classroom.
- **Create a sculpture out of papier mâché that expresses an idea about your own environment.**

FIRST

Draw a sketch of your idea with a pencil or make a small model of your idea with modeling clay.

TO BEGIN

Use newspaper to build the form of your sculpture. Use masking tape to hold the newspaper in shape.

Prepare the papier mâché in a bowl by mixing flour or wheat paste with water to a creamy consistency. (Check out a book from the library if you want more detailed directions for mixing papier mâché.)

Tear some newspaper into half-inch strips. Dip the newspaper strips into the papier mâché mixture to get them wet. Wipe off the excess with your fingers. Lay the strips on your form, overlapping them a little each time. Cover the form with two or three layers of papier mâché strips.

Let the sculpture dry for 48 hours.

It's time to decorate.

Paint the sculpture with tempera or acrylic paint. Let the paint dry completely. Add any details with recycled bits of fabric, beads, yarn, and so on.

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Rubbings from Nature

Collect objects made by humans, as well as natural objects from the environment.

Classify the objects and divide them into two groups, natural and made by humans. For example

Natural	**Made by Humans**
leaves	corduroy cloth
bark	ceramic tiles
insect wings	sandpaper
fish skeleton	corrugated cardboard
seashells	window screen

- Create two designs by taking rubbings from the objects you collect in each group.

To begin a rubbing, lay a sheet of paper over the object you wish to use. With a crayon, color gently over the object. An impression will appear on the paper. The outline and texture of the object will be visible.

Be creative. Use a variety of colors for your rubbing. Overlap the rubbing to create variety in your composition.

Display your work. Group the designs made with natural objects in one space. Then display the rubbings made from the other objects.

Compare and contrast the visual qualities of designs.

Notice the colors

shapes detail

texture arrangement

overlapping

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Landscape Painting

Landscapes are popular subjects for artists to paint. Some artists paint their landscapes realistically, just as they look in nature. Other artists paint abstract landscapes. Abstract painters paint in a unique way with colors not usually found in nature.

Impressionist painter Claude Monet painted the sunlight as it sparkled on the landscape. Belgian artist Vincent van Gogh tried to express his feelings through his landscapes with short, rapid brush strokes and intense colors.

Check your local library for art books with reproductions of landscape paintings. Some artists to look for are

Claude Monet	Jean Baptiste Camille Corot
Vincent van Gogh	Thomas Cole
Paul Cezanne	

Compare and contrast different styles of landscape painting. Discuss your observations with members of your class.

Discover these characteristics

texture	detail
space/distance	realistic or abstract style
movement/direction	color

- **Create your own landscape painting** that describes a particular environment, for example, a desert, mountain range, forest, or seashore. Use watercolor, tempera, or acrylic paints.

  Display your painting for others to enjoy.

  OR

- **Design an underwater environment.** Create a society of new sea animals. Imagine that this environment evolved after many centuries of erosion and change.

  Use crayons, oil pastels, or paints to color your environment.

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Mask Making

- **Recycle materials to create a mask.** Use cardboard or fabric for the foundation of the mask. Add other materials for decoration with glue or by sewing.

Some suggestions for materials are

cardboard

boxes

plastic bottles and caps

packing materials

egg cartons

paper rolls

beads, trims, fabrics

Finishing touches:

If your mask is made of materials that can be painted, use spray paint or a paint brush to paint it all one color. (Using only one color will create harmony among the many materials.) Allow the materials themselves to provide visual interest.

Organize a mask parade or some other way to display your work for the rest of the school.

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Handmade Papers

Handmade papers can be created from recycled papers, cloth, and fibrous plants.

Research the possibility of making handmade papers in your classroom.

Visit your school and community libraries and check out books on handmade paper.

Outline the process for your teacher. Organize a group to collect the necessary supplies.

Design a system of working so that everyone in the class can produce some paper.

Hint: An ordinary kitchen blender, a piece of window screen, some scrap wood, a bucket, and a sponge are some of the simple supplies you will need to make paper.

The art of papermaking is being revived all over the United States. Investigate your local community of artists for a papermaker.

Invite a papermaker to your classroom. Ask him or her to demonstrate some simple techniques to use in school.

Two very good books on papermaking are

Paper-Making by Jules Heller
Wastson-Guptil Publications

The Art of Papermaking by Bernard Toale
Davis Publications

142

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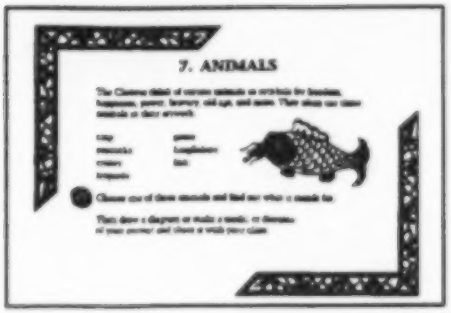

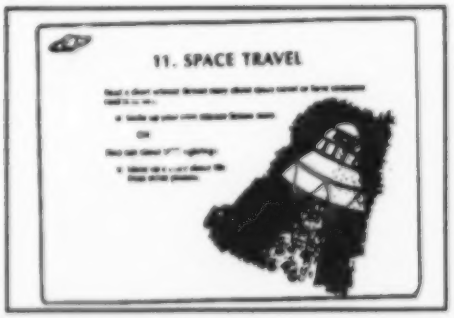

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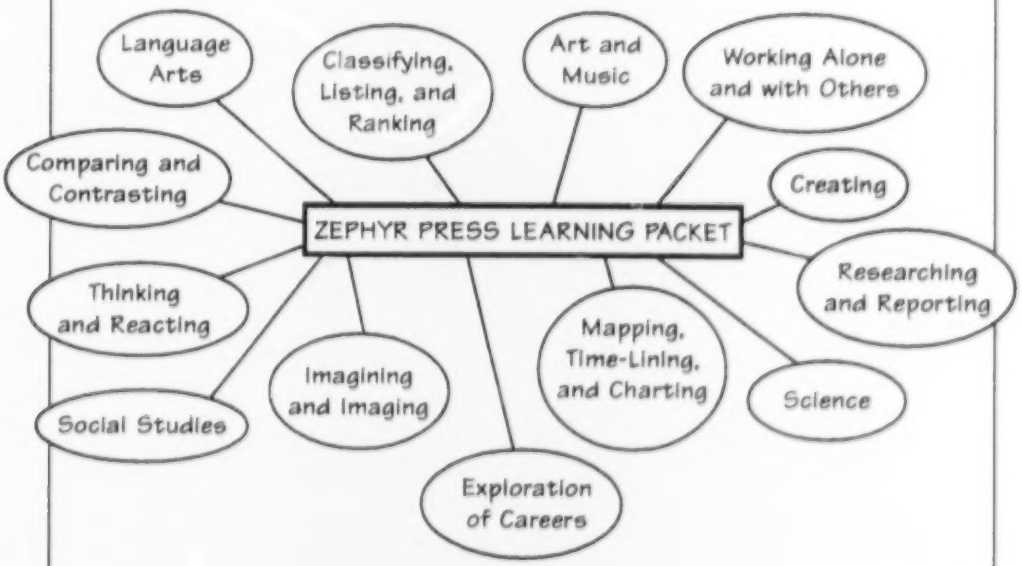

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